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**AUSTRALIA**

**PATENTS ACT 1990**

**PROVISIONAL SPECIFICATION**

for the invention entitled:

**“Cable Handling Apparatus”**

The invention is described in the following statement:

## CABLE HANDLING APPARATUS

### 5 Field of the Invention

This invention relates to a cable handling apparatus. In a particular non-limiting aspect it relates to a vehicle which can lay optic fibre cable from a rotating cable reel as the vehicle travels along the ground, or across water or in the case of an aircraft 10 such as a helicopter as it travels through the air.

### Background of the Invention

In wartime situations, commanders need to have effective and instantaneous 15 communication with their fellow commanders over the battle field. Of course, an important element of such communication is that it should not be prone to being intercepted by the enemy.

Clearly, radio waves can be readily intercepted and depending upon the 20 sophistication of the enemy's code cracking procedures may in some instances be deciphered by the enemy

It is possible to dramatically reduce the likelihood of interception by laying cable such as fibre optic cable to carry the communications. However, as the cable must be 25 laid on the battlefield, the actual act of laying the cable can be quite hazardous. Thus, to reduce the risks involved with cable laying and retrieval, the method of laying the cable should be one which is rapid and efficient, thereby reducing the amount of time personnel laying the cable are exposed to the battlefield hazards.

30 Thus, this invention seeks to provide cable handling apparatus which can assist in rapid cable laying and/or cable retrieval operations.

**Disclosure of the Invention**

The invention provides in one aspect a feed control assembly for feeding a cable on and off a rotatable reel comprising,

5 a guide for controlling the location of the cable as it feeds on and off the reel, and

a drive assembly arranged to reciprocate the guide as the cable feeds through it.

10 The drive assembly may comprise a rotary member. The rotary member may comprise a belt or chain. The belt or chain may be driven by a sprocket or pulley arrangement.

15 The belt or chain may be connected via a guide mount to the guide. It may be connected by way of a pin to the guide mount. The pin may be slidable in a slot provided in the guide mount.

In turn, the guide mount may be slidable along a drive housing for the belt or chain.

20 The feed control assembly may be mounted on a vehicle. It may be mounted at the rear of the vehicle.

Similarly, the rotatable wheel may be mounted on the rear of the vehicle and arranged so that cable from the reel may feed through the guide.

25 Drive means may be provided for rotating the reel. The drive means may be hydraulically driven. The drive means may also operate to reciprocate the guide. They may reciprocate the drive by driving through the sprockets and chain to move the pin and hence reciprocate the guide.

30 The chain or belt may be driven via an intermediate chain or belt. The intermediate chain or belt may also be housed in the drive housing.

In one particular form of the invention, the feed control assembly, rotatable reel and drive means may comprise a discrete assembly which can be loaded as a unit onto the back of a vehicle as required. The discrete unit may include own fuel supply and/or 5 battery for the drive means. It may include "umbilical" wiring which is connected to a control unit. The control unit may then be placed in the cab of a vehicle or a helicopter.

Suitably, the feed control assembly may be associated with means for controlling the 10 rate of rotation of the rotatable reel. It may also include means for varying the direction of rotation of the reel. It may also allow the reel to be free spinning or braked.

Viewing means for displaying the functioning of the reel to an operator may be 15 provided. The viewing means may be provided in the cab of a vehicle. They may comprise an electronic monitor camera connected to an electronic viewing screen for displaying images from the monitor camera.

Preferred aspects of the invention will now be described with reference to the 20 accompanying drawings.

#### **Brief Description of the Drawing**

Figure 1 shows an isometric of a vehicle including a feed control assembly 25 according to the invention;

Figure 2 shows a fragmentary enlarged view of the feed control assembly and cable reel of Figure 1;

Figure 3 shows a fragmentary enlarged view of the feed control assembly of Figure 1;

30 Figure 4 shows an enlarged view of a clip for securing the reel to a vehicle;

Figure 5 shows an isometric view of the rear of the feed control assembly shown in the earlier drawings;

Figure 6 shows a plan view of a section of the feed control assembly of Figure 5 in various configurations;

Figure 7 shows a fragmentary isometric view of the feed control assembly and associated hydraulic drive mechanisms;

5 Figure 8 shows a fragmentary isometric view of the vehicle cab; and

Figure 9 shows a hydraulic circuit for controlling the feed control assembly.

The various elements identified by numerals in the drawings are listed in the following integer list.

10

#### Integer List

1	Cable handling
3	Cab
15	5 Reel
	7 Cable (fibre optic or other cable)
	9 Connector
	11 Mounting assembly
	13 Clips
20	15 Mounting bar
	19 Guide
	20 Latch
	22 Guide mount
	23 Recess
25	24 Drive housing
	26 Mounting legs
	28 Chain
	29 Sprocket
	30 Sprocket
30	31 Spacer bar
	32 Bolt
	33 Pin

- 35 Slot
- 36 Sprocket
- 37 Drive chain
- 38 Drive shaft
- 5 40 Hydraulic motor
- 42 Coupling
- 44 Gearbox
- 46 Drive shaft
- 48 Control lever
- 10 50 Gear pump
- 51 Hydraulic fluid line
- 52 Hydraulic fluid line
- 54 Tank
- 55 Return line
- 15 57 Light
- 59 Electronic monitor camera
- 60 Video screen
- 62 On-off switch
- 64 Potentiometer (pressure)
- 20 66 Electric joystick
- 68 Strainer
- 69 fluid line
- 70 Engine
- 71 Coupling
- 25 77 Pressure gauge
- 79 Pressure relief valve
- 80 Return line
- 81 Filter
- 83 Flow control cartridge assembly
- 30 85 Double solenoid valve
- 87 Crossline relief valve
- 89 Filter

Referring to Figure 1 of the accompanying drawings, there is shown a cable handling vehicle generally designated 1 with a cab 3.

5 A rotatable reel 5 for fibre optic cable 7 is mounted on the rear of the cable handling vehicle via the mounting assembly 11. Clips 13 are used to secure the mounting assembly and hence reel 5 to the vehicle.

10 The fibre optic cable 7 is provided with a connector 9 which protrudes from the rear of the vehicle beyond the feed control assembly also mounted on the rear of the vehicle.

15 Referring to Figures 2 to 7, it can be seen that the feed control assembly 15 is mounted on the rear of the vehicle via the mounting bar 17.

20 It includes a guide 19 with a narrow upper portion and a broader lower portion. A latch 20 is arranged to be opened and closed so that the connector 9 may be fed through the lower portion initially after which the latch is closed so as to ensure that the cable runs through the upper portion of the guide. As the upper portion of the guide is of narrower width than the connector 9, closing of the latch ensures that the cable 7 does not accidentally slip out of the guide.

24. The guide is mounted on the guide mount 22 which is slidable on the drive housing 24.

25 As there are a number of bolts 32 protruding from one side of the drive housing a recess 23 is provided in the internal profile of one side of the guide mount to allow the guide mount to slide past the bolts.

30 Mounting legs 26 are provided on either side of the drive housing and these in turn are used to mount the feed control assembly generally designated 15 on the mounting bar 17.

As can be seen more clearly in Figures 5 and 6, the feed control assembly includes a chain 28 for rotation about the sprockets 29 and 30. Sprocket 29 acts as the drive sprocket and sprocket 30 acts as an idler sprocket. A spacer bar 31 is held in the 5 housing between the opposed sides of the chain by the bolts 32. The spacer bar may typically comprise a low friction plastics material such as Teflon.

The chain 28 is driven by a drive chain 37 arranged to drive the sprocket 36. Power for the drive chain is provided through the drive shaft 38 and associated sprocket. 10

A pin 33 is mounted on the chain 28 and extends through a slot 35 provided on one side of the guide mount 22.

Thus, it can be seen that the pin moves with the chain 28 causing the guide mount to 15 reciprocate along the length of the drive housing 24.

Referring to Figure 7, drive power for the feed control assembly 15 and reel 5 is provided by the hydraulic motor 40.

20 The hydraulic motor acts through the coupling 42 and gearbox 44 to direct power for turning the reel through drive shaft 46. Drive shaft 38 from the same gearbox provides power for the feed control assembly.

Operation of the hydraulic motor is externally controlled by the control lever 48 25 and/or by the controls in the cab shown more clearly in Figure 8. The controls in the cab comprise the on-off switch 62, potentiometer 64 and electric joystick 66. The operation of these will be described in more detail hereinafter.

Referring to Figure 9, the drive and control arrangement for the operation of the reel 30 and feed control assembly comprises an engine 70 connected via a coupling 71 to a gear pump 50. The gear pump obtains hydraulic fluid from the tank 54 mounted on the rear of the vehicle via the fluid line 69 after being strained by the strainer 68.

Hydraulic fluid under pressure is fed via the hydraulic fluid line 51 from the gear pump and pressure in this line is displayed by the pressure gauge 77. A pressure relief valve 79 connected to the fluid line 51 and controlled by the potentiometer 64 is 5 used to adjust the pressure in line 51 to a desired level for operating the apparatus.

A return line 80 for returning hydraulic fluid from the pressure relief valve to the tank 54 is provided for recycling excess hydraulic fluid. A filter 81 is provided downstream of the pressure relief valve to filter fluid prior to entry of the hydraulic 10 fluid into the fluid control cartridge assembly 83.

The fluid control cartridge assembly is controlled by the electric joystick 66. This sets the flow rate of the hydraulic fluid and hence the ultimate speed of the hydraulic motor 40 driving the apparatus.

15 A double solenoid valve 85 operating through the cross line relief valve 87 controls the direction of rotation of the motor 40 or allows freewheeling of the motor by disconnecting the hydraulic fluid flow completely. Operation of the double solenoid valve is via the control lever 48.

20 Thus, it can be seen that the control circuit allows the hydraulic motor to be driven in either direction. Thus it is possible to lay down or take up cable at speeds controlled according to the setting of the electric joystick 66. Alternatively, it can be allowed to freewheel by complete disconnection of the motor.

25 Referring to Figure 9, it can be seen that the cab includes an on-off switch 62 for controlling the pump 50 and also includes the potentiometer 64 and electric joysticks 66 on the dash to allow control of the cable laying apparatus from within the cab.

30 The cab also includes a video screen 60 for displaying images from the electronic monitor 59 mounted on the exterior rear of the cab.

10

A light 57 is also provided to illuminate the cable and feed control assembly so that it can be viewed while cable laying at night. Alternatively or additionally the electronic monitor camera 59 may have night vision capability.

- 5 It will be also understood that where the word "comprise", and variations such as "comprises" and "comprising", are used in this specification, unless the context requires otherwise such use is intended to imply the inclusion of a stated feature or features but is not to be taken as excluding the presence of other feature or features.
- 10 The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that such prior art forms part of the common general knowledge in Australia.

15

Dated this 30th day of September 2003

**Ian Charles Boon**

by his patent attorneys Morcom Pernat

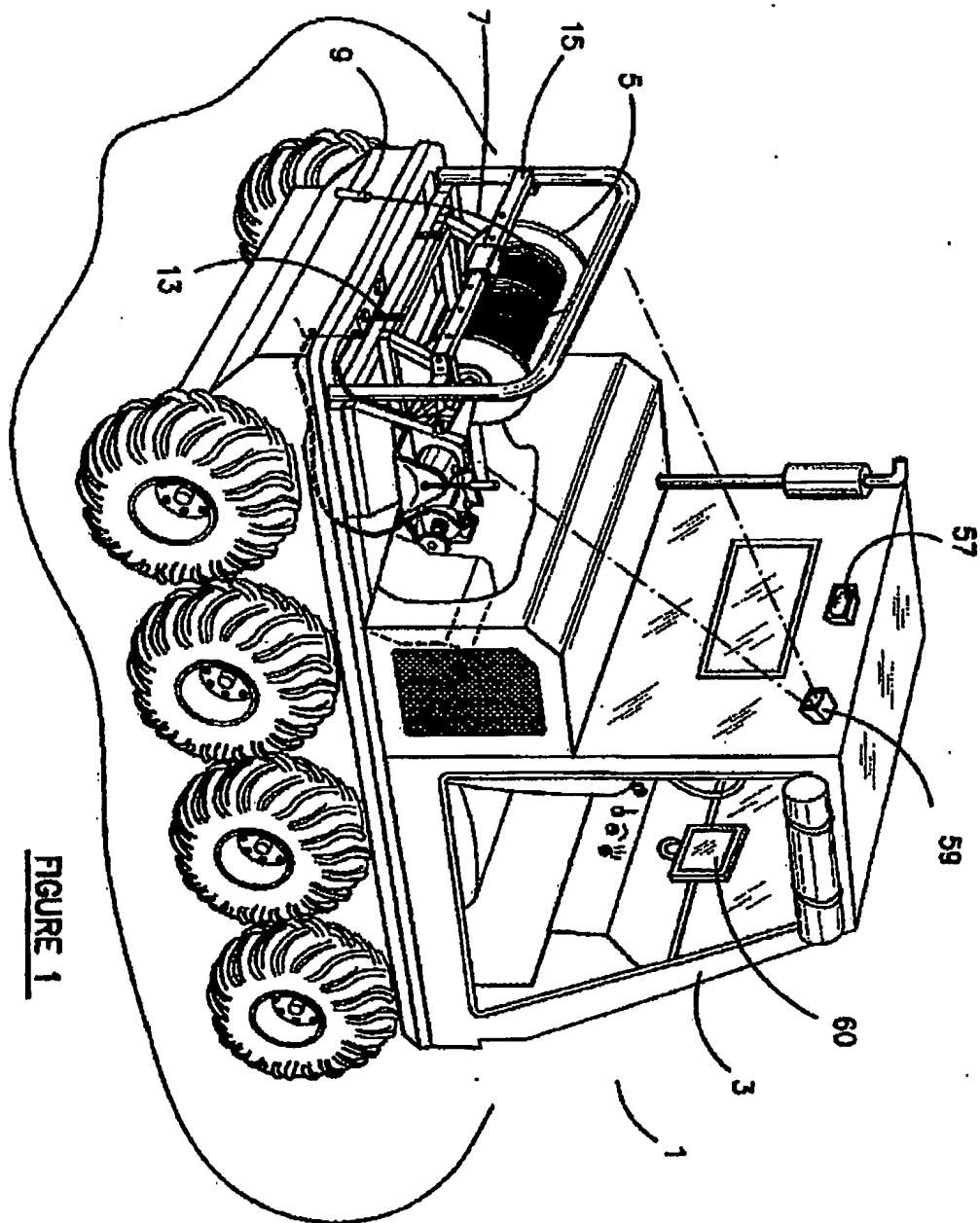


FIGURE 1

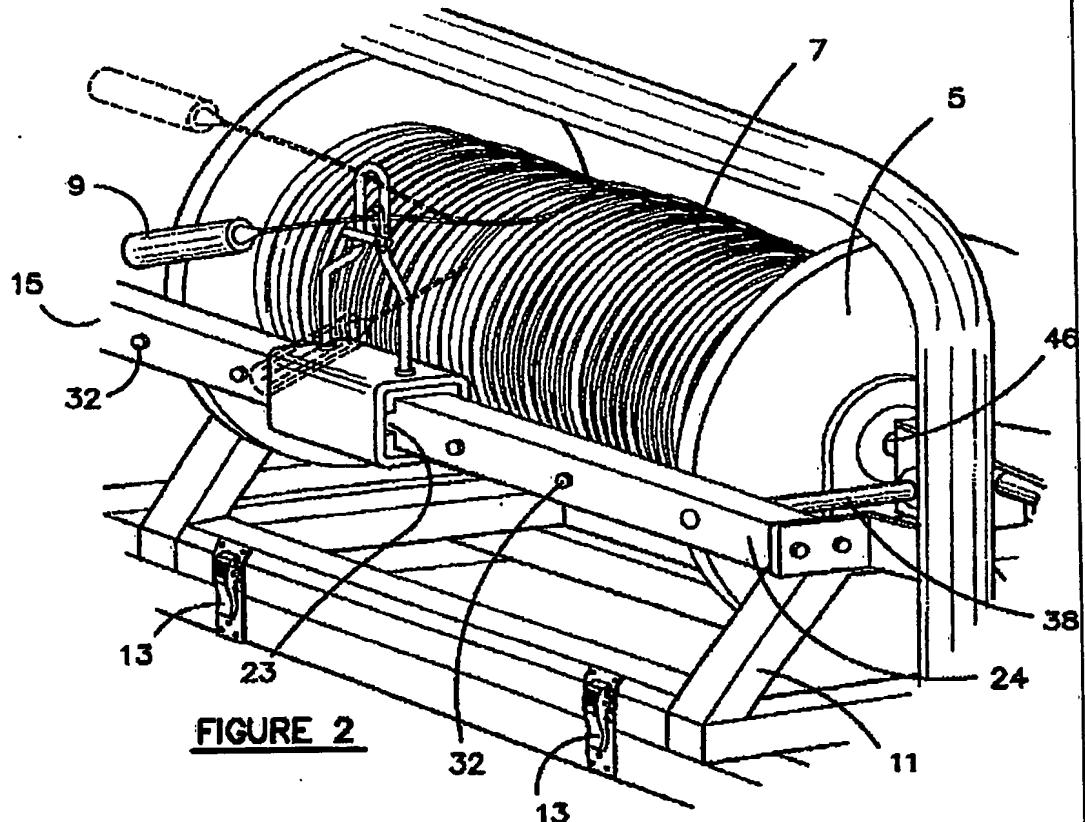


FIGURE 2

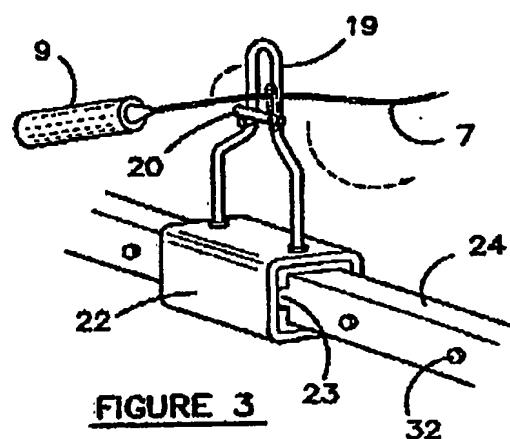


FIGURE 3

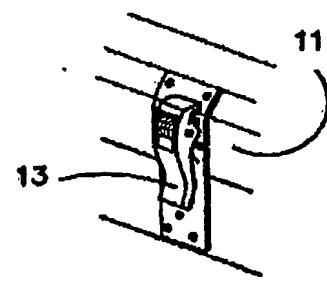
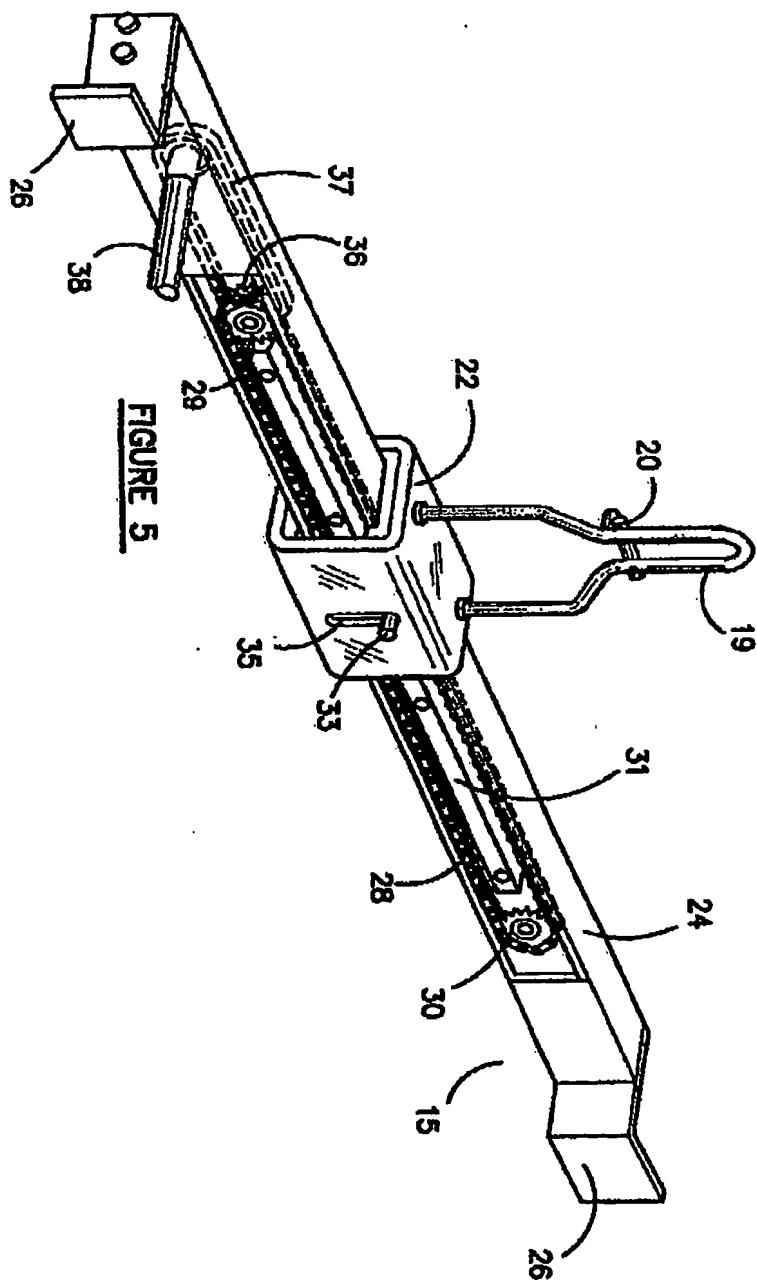


FIGURE 4



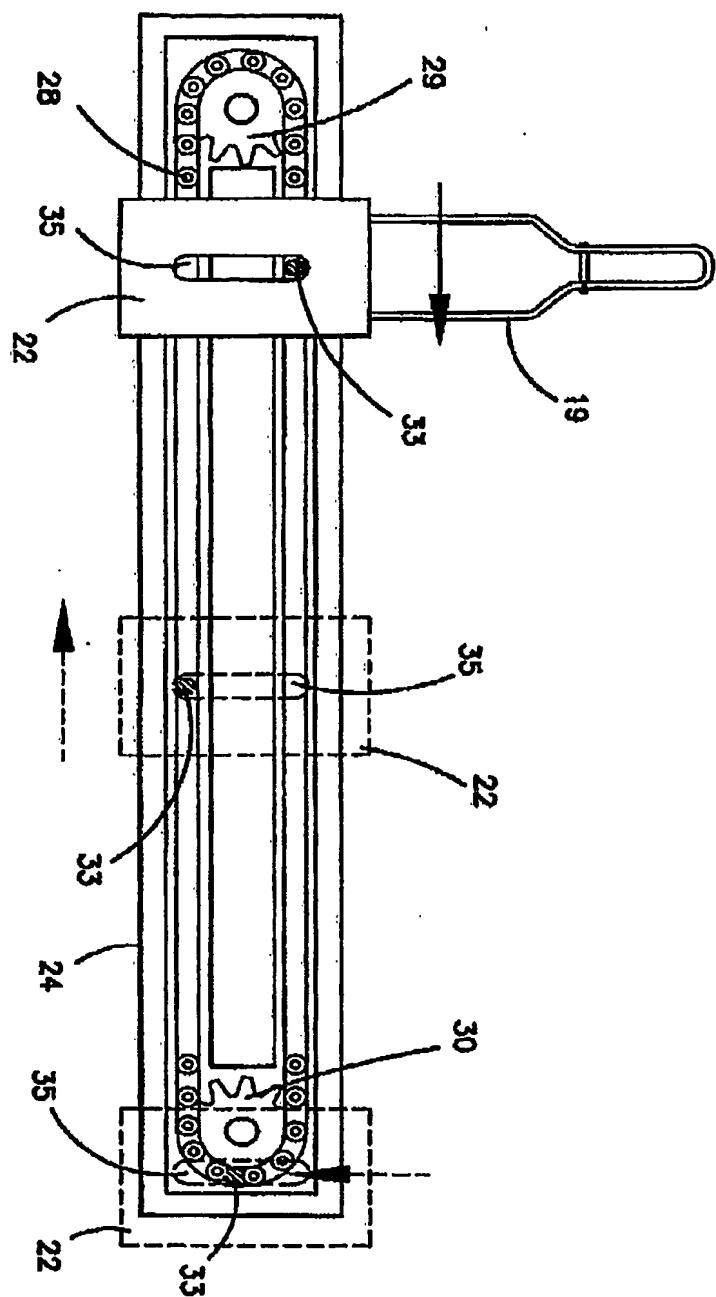


FIGURE 6

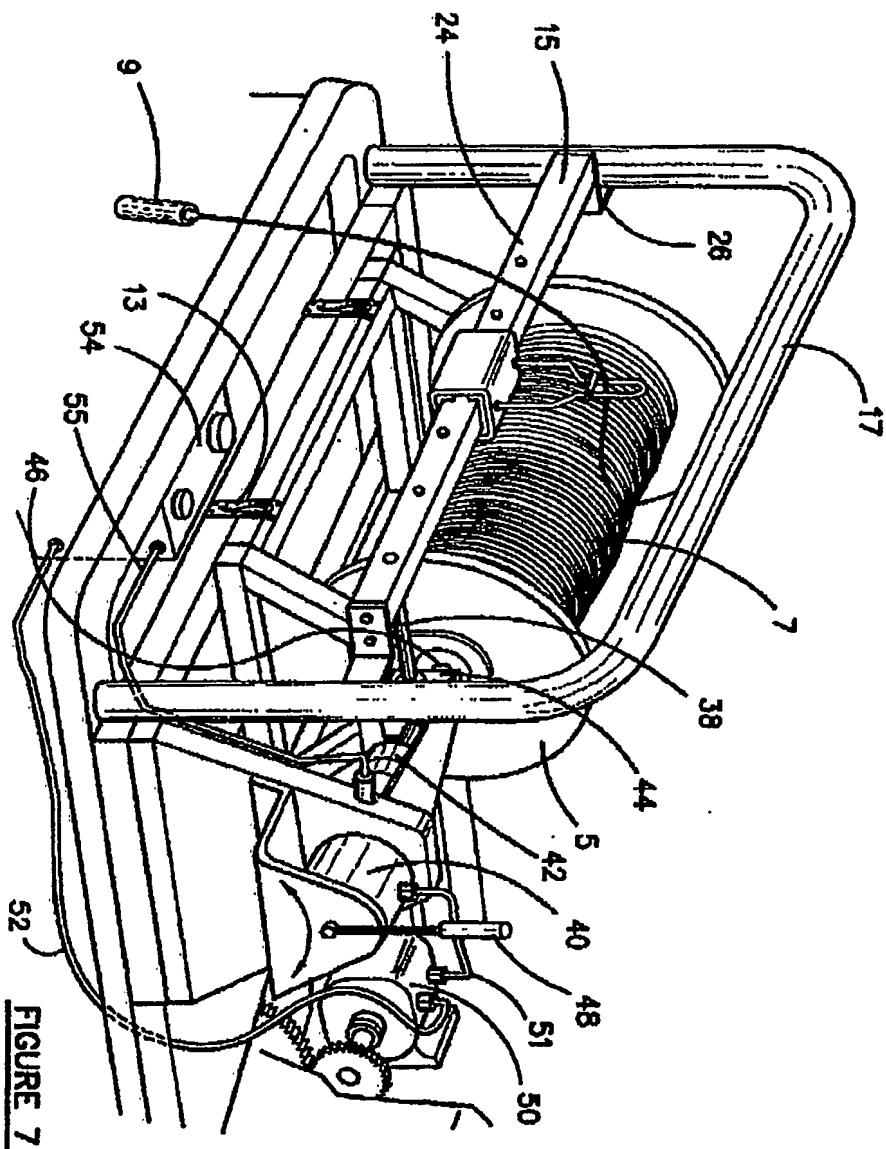
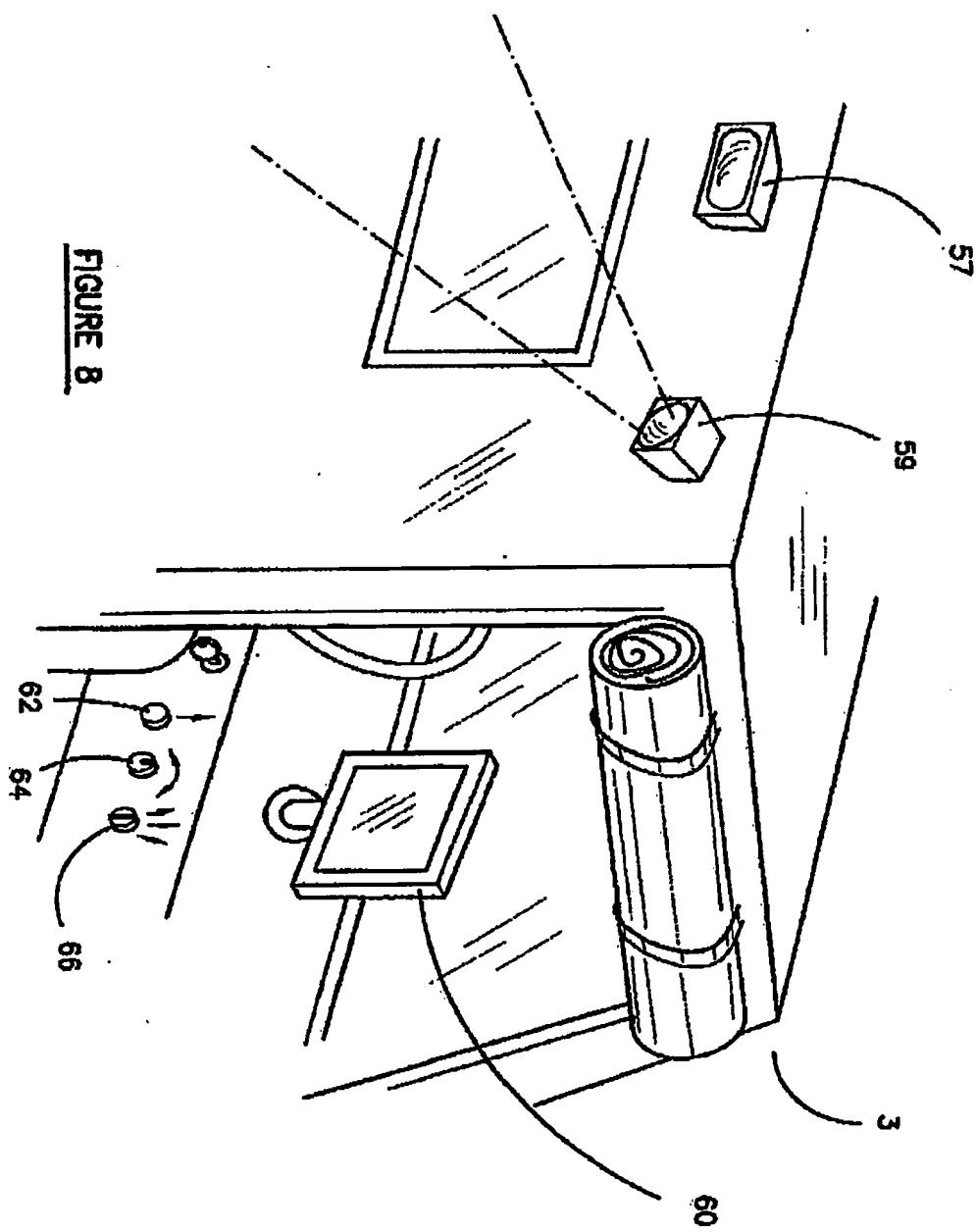
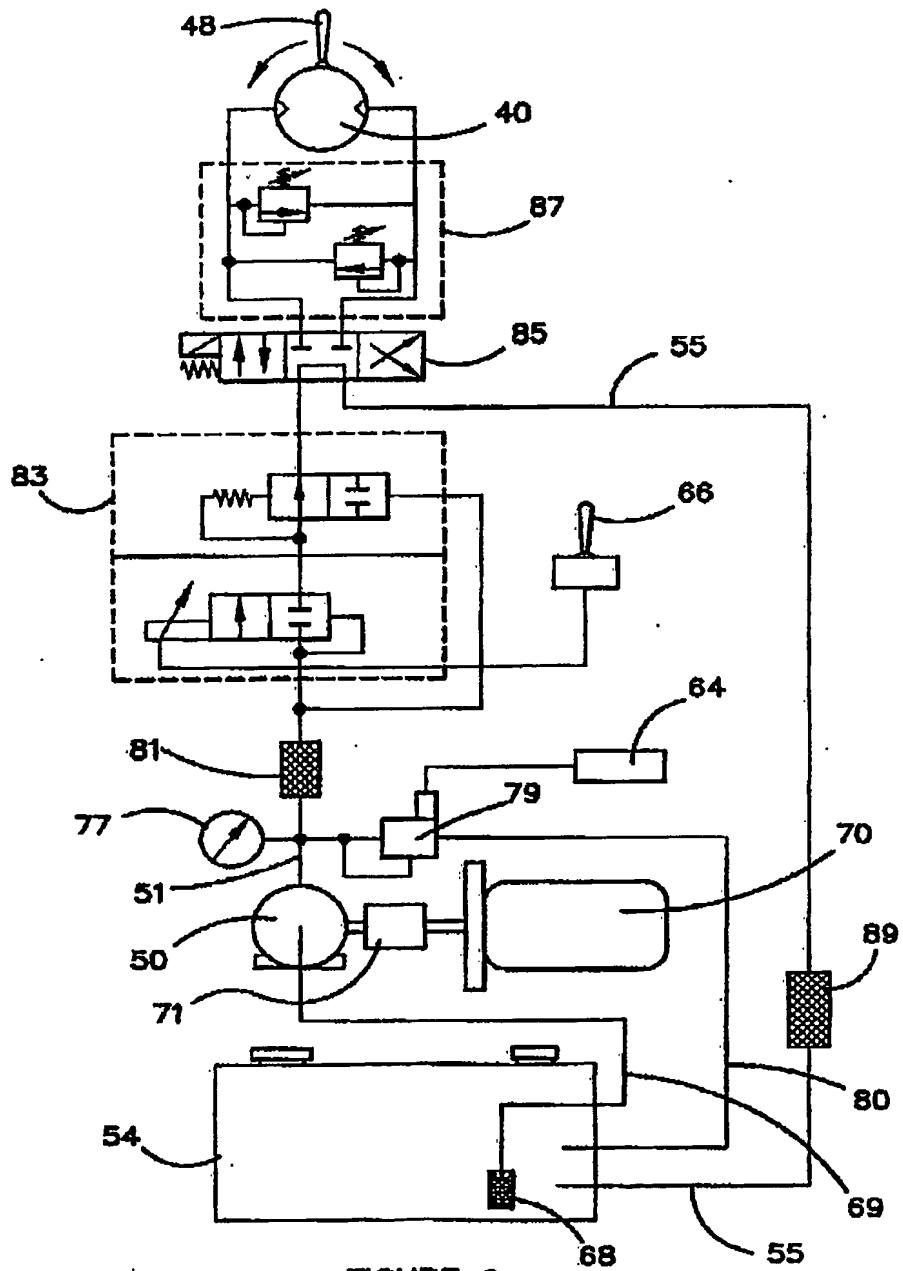


FIGURE 7





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